Paucibacillary paratuberculosis in a goat

Brandy Amber Catton

Abstract — A 5-year-old Saanen doe was presented with emaciation, good appetite, normal feces, and a dry flaky hair coat. Johne's disease was tentatively diagnosed. Gross postmortem findings were a thickened, corrugated ileum and enlarged edematous mesenteric lymph nodes. Histologically, there was extensive lymphocytic infiltration of the ileal lamina propria. *Mycobacterium paratuberculosis* could not be identified or cultured.

Résumé — Paratuberculose paucibacillaire chez une chèvre. Une chèvre Saanen de 5 ans a été présentée avec émaciation, bon appétit, fèces normales et pelage squameux sec. Un diagnostic provisoire de maladie de Johne a été posé. Les trouvailles macroscopiques post-mortem comprenaient un iléum épaissi et plissé ainsi que des ganglions lymphatiques mésentériques œdémateux et de volume augmenté. À l'histologie, on remarquait une infiltration lymphocytaire extensive du chorion de l'iléum. *Mycobacterium paratucerculosis* n'a pu être identifié ni cultivé.

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A 5-year-old, registered part-bred, Saanen goat from a local 350-head, caprine dairy herd was presented for clinical examination. She appeared normal but had become quite thin during the previous 2 to 3 mo. Several cases of Johne's disease had been confirmed in the herd during the past year.

On clinical examination, the doe was in poor body condition (body condition score 2 out of 5) and had a dry, rough hair coat. She ate and drank willingly. Rumination was normal and feces were normally formed. Her mentation was normal but demeanor slightly dull. The tentative diagnosis was Johne's disease and she was euthanized.

Gross postmortem findings revealed a moderate depletion of body fat. A 50 cm segmental portion of the distal ileum was markedly edematous along its mesenteric border. Numerous linear beaded to plaque-like thickenings were present on the serosa extending to the mesenteric border. The ileum was thickened and mildly corrugated. The local mesenteric lymph nodes were enlarged by 2 to 3 times the normal size, and showed moderate to marked expansion of both the cortex and the medulla (7).

Histologically, the ileal lamina propria was moderately to severely widened and cellular. Lymphocytes predominated this cellular infiltrate, but there were also mild to moderate numbers of small epithelioid cell foci and occasional multinucleate giant cells. Few areas had large numbers of neutrophils (7).

Lymphocytic infiltration of the ileal lamina propria could be confused with Peyer's patches, even though Peyer's patches are not usually prominent in adult animals. To differentiate, a special silver-containing stain was used to try and identify reticulin, a connective tissue present only in lymphoid tissue (5). A negative reticulin stain confirmed that the proposed lymphocytes were not part of a Peyer's patch.

The mesenteric lymph node had multifocal to coalescing areas of macrophages, epithelioid cells, and multinucleate giant cells present throughout. Additionally, there were multiple foci of necrosis, characterized by destruction of the lymph node parenchyma and the presence of amorphous to granular cytoplasmic and nuclear debris. No acid-fast bacteria were seen on any sections stained with acid-fast stain. Two sections of ileum were negative for mycobacteria on culture.

The clinical presentation and gross lesions of this doe were very characteristic of caprine Johne's disease. Typically, goats with Johne's disease are emaciated with dry flaky skin and good appetite (9,10). Unlike cattle, their feces maintain a normal consistency and mental depression can be seen (9,10). It is speculated that since caprine and ovine feces are naturally drier than bovine feces, a much greater intestinal lesion is required to produce diarrhea (10).

Goats and sheep can have 2 main pathological presentations of paratuberculosis. A multibacillary or lepromatous form that is well recognized in sheep (2), and is similar to that in cattle where it is characterized histologically by a granulomatous enteritis predominated by macrophages filled with acid-fast bacteria. A second form of the disease seen in sheep and goats is the paucibacillary or tuberculoid form. In this form, the

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lymphocyte is the predominant cell type in the enteric inflammatory infiltrate and few, if any, mycobacteria are visible (2,4,6,9). Multibacillary lesions are associated with strong humoral immune response, whereas paucibacillary lesions are linked with strong cell-mediated immune response (1,2,4,6,9). Grossly, one cannot differentiate between paucibacillary lesions and multibacillary lesions (2).

In cattle, it is not possible to diagnose Johne's disease definitively without demonstrating *M. paratuberculosis* by culture or acid-fast staining. However, if sheep and goats have responded with the paucibacillary form of the disease, *M. paratuberculosis* may not be observed following either acid-fast staining or culture (2,4,8,9). One study showed that in 30% of goats with paucibacillary lesions, no acid-fast bacteria were seen in the mucosa of grossly affected sections and only 42.1% of both paucibacillary and multibacillary cases produced mycobacterial growth (4). A similar study in sheep showed that in 79% of sheep affected with paucibacillary lesions, acid-fast mycobacteria could not be demonstrated within macrophages (2). Therefore, *M. paratuberculosis* is not ubiquitous in clinical paratuberculosis of small ruminants, as in cattle.

There is some controversy in the literature as to which section of small intestine is most affected by Johne's disease in goats. Some state that the jejunum is the most severely affected (4), but others highlight the ileum as being the most common site for lesions (9–12). This doe had notable gross lesions in the distal 50 cm of her ileum and, grossly, her jejunum appeared normal. The jejunum was not examined histologically; therefore, its involvement cannot be fully qualified. It has been documented previously that jejunum can be grossly normal, yet affected histologically (10).

The histologic lesions in this goat fitted very closely with a category of lesions described by Corpa et al (4). They found that 14.7% of the paratuberculoid goats in their study had diffuse lymphocytic lesions, a paucibacillary form of paratuberculosis. These animals had diffuse granulomatous enteritis "where the predominant inflammatory cells were lymphocytes infiltrating the entire lamina propria. Among the lymphocytes, some macrophages and well-differentiated Langhans giant cells were also present. Acid fast bacteria were absent in a significant proportion of sections."

The prevalance of paucibacillary paratuberculosis is not known with certainty, but in the study done by Corpa et al (4), 15% to 27% of animals with confirmed Johne's disease were paucibacillary. In sheep, it is estimated that the prevalence is about 31% (2).

The clinical significance of paucibacillary paratuberculosis versus multibacillary paratuberculosis is not known. One difference, however, is the ease of diagnosis. For sheep with the paucibacillary form, the agar gel immunodiffusion (AGID) test and enzyme linked immunosorbent assay (ELISA) are often negative, and there is little chance of detecting acid-fast bacteria in the feces (3,11). It is not known if the same holds true for goats, but it is certainly possible, given the many similarities between these 2 species. Also, it is not known if paucibacillary paratuberculosis has the same potential for transmission as multibacillary paratuberculosis. One would speculate that paucibacillary cases would be of less risk to other ruminants, since there are few or no causative bacteria present in the gastrointestinal tract to spread infection traditionally via the fecal oral route.

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